

Edward Velasco

**Behavioural surveillance and HIV prevention
in men who have sex with men.**

Reports from Australia, Belgium, Canada,
France, Germany, Switzerland,
the United Kingdom, and the United States

Oktober 2007

Bestell-Nr. SP I 2007-306

ISSN 1860-8884

Veröffentlichungsreihe der Forschungsgruppe Public Health
Schwerpunkt Arbeit, Sozialstruktur und Sozialstaat
Wissenschaftszentrum Berlin für Sozialforschung (WZB)
10785 Berlin, Reichpietschufer 50
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Paper developed from the workshop:

“Taking a Closer Look: Prevention and Surveillance of HIV and STIs in MSM”
Robert Koch Institute (RKI)
February 12-13, 2007

“Taking a Closer Look” is a part of the RKI KAB|a|STI-Study:
Knowledge, Attitudes, Behaviour as to Sexually Transmitted Infections
among Men Who Have Sex With Men in Germany:
[http://www.rki.de/ DE/Content/InfAZ/S/STD/Studien/KABaSTI/KABaSTI.html](http://www.rki.de/DE/Content/InfAZ/S/STD/Studien/KABaSTI/KABaSTI.html)

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Abstract

In 2006 the German Robert Koch Institute conducted the KABaSTI study, a national cross-sectional survey on knowledge, attitudes, and behaviour related to sexually transmitted infections among men who have sex with men (MSM) in Germany. Within the context of the study, a two-day workshop was organized with social scientists and epidemiologists from Australia, Belgium, Canada, France, Germany, Switzerland, the United Kingdom, and the United States to engage in an open dialog about the latest trends in sexual risk behaviour in MSM populations.

Participants presented recent data on risk management strategies among MSM beyond consistent condom use, MSM communication of HIV status related to sexual risk taking, the effects of HIV-related serosorting on the incidence of other sexually transmitted infections, trends in HIV testing, the uses of online HIV data in surveillance, and the consequences of early HIV diagnosis and therapy on subsequent sexual risk behaviour.

Zusammenfassung

Im Jahre 2006 wurde am Robert Koch-Institut im Auftrag des Bundesministeriums für Gesundheit eine große bundesweite Querschnittstudie zu Wissen, Einstellungen und Verhalten bezüglich sexuell übertragbarer Infektionen (STI) bei homo- und bisexuellen Männern durchgeführt (KABaSTI-Studie). Im Rahmen dieser Studie fand in Berlin ein zweitägiges Arbeitstreffen mit Sozialwissenschaftlern und Epidemiologen aus Australien, Belgien, Deutschland, Frankreich, Großbritannien, Kanada, der Schweiz und den Vereinigten Staaten statt, um in einen offenen Dialog über die neuesten Trends im sexuellen Risikoverhalten bei homo- und bisexuellen Männern zu treten.

Die teilnehmenden Wissenschaftler präsentierten neueste Daten zu Risikominimierungsstrategien abseits der durchgängigen Kondomverwendung, zum Zusammenhang zwischen Kommunikation über den HIV-Serostatus und dem Eingehen sexueller Risiken, zum Einfluss von HIV-Serosorting auf die Inzidenzen anderer STI, zu Trends im HIV-Testverhalten, zum Beitrag von online erhobenen HIV-Daten für die institutionelle Surveillance und zu den Konsequenzen frühzeitiger HIV-Diagnosestellung und -Therapie für sexuelles Verhalten.

Die KABaSTI-Studie kann in deutscher Sprache über das RKI bezogen werden.

Schmidt AJ, Marcus U, Hamouda O (2007): **KABaSTI-Studie** – Wissen, Einstellungen und Verhalten bezüglich sexuell übertragbarer Infektionen. Aufbau einer deutschlandweiten 2nd Generation Surveillance für HIV und andere sexuell übertragbare Infektionen bei Männern mit gleichgeschlechtlichem Sex. Bericht an das Bundesministerium für Gesundheit, *mimeo*, Robert-Koch-Institut: Berlin.

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Foreword

Over twenty-five years since the first HIV diagnoses were made populations of men who have sex with men (MSM) still carry much of the disease burden in the industrialized countries. At the outset of the epidemic, HIV was labelled the “homosexual disease” because it spread quickly in MSM populations in many urban centres. Armed with little knowledge about the MSM population, health officials began to look at the social and behavioural factors of HIV in MSM, including social venues like bathhouses and saunas, and risk behaviour found in sexual practice. Public health scientists and physicians today have come a long way in their treatment and prevention efforts since those first cases.

Today, scientists from countries that have had a long standing with HIV surveillance and MSM recognize the importance of continuing to create interventions that focus on social and behavioural drivers of HIV within MSM populations. Decades of research have led to comprehensive and well-targeted behavioural surveillance efforts across the world. The RKI Berlin workshop is the first of its kind, and invited leading scientists in HIV/AIDS and MSM surveillance to engage in an open dialog about the latest trends occurring in MSM populations and behavioural surveillance.

Innovative strategies in HIV surveillance are increasingly seen as an important part of the fight against sexually driven HIV. Additionally, new knowledge from such surveillance trends is important to the development of effective prevention efforts for MSM. HIV is affecting MSM in increasingly complex, specific and focused ways. As a result, tackling HIV in MSM populations in the industrialized countries requires comprehensive strategies that can provide effective surveillance to address the complex clinical and behavioural patterns arising in this population.

New inquiries contribute to a better understanding of the major transmission drivers – especially social and behavioural factors – at both the community and individual levels in order to appropriately target HIV interventions and maximize impact on HIV incidence in the industrialized countries. “Taking a Closer Look” offered participants from eight different countries a unique chance to inquire about contemporary issues in behavioural surveillance of HIV in MSM.

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Background

In 2006 the German Robert Koch Institute performed a study on Knowledge, Attitudes, and Behaviour as to Sexually Transmitted Infections (KABaSTI) in MSM in Germany. Within the context of the study, a two-day workshop in February 2007 was organized in Berlin. The workshop invited leading behavioural research scientists from Australia, Belgium, Canada, France, Germany, Switzerland, the United Kingdom, and the United States to engage in an open dialog about the latest trends occurring in MSM populations. Discussions were held and findings were exchanged among participants working in the field.

The workshop explored salient issues in the area of knowledge, attitudes, and behaviour related to HIV and other sexually transmitted infections in MSM in participant countries. Participants presented recent data and trends related to the following areas of interest:

- Emerging risk management strategies among MSM; including *serosorting*, *seropositioning*, withdrawal, and dipping;
- The effects of HIV-related *serosorting* (deliberately choosing sexual partners based on HIV serostatus) on incidences of other sexually transmitted infections;
- Trends in HIV testing, the uses of HIV test data in surveillance, and the consequences of early HIV diagnosis on subsequent sexual risk behaviour;
- MSM communication of HIV status related to sexual risk taking in the Internet, and;
- HIV prevention strategies for MSM: emerging risk management strategies beyond consistent condom use.

The structure of the meeting consisted of a two day workshop divided into four sessions. Three sessions involved a series of participant-led presentations focusing on topics and issues from work in their home countries. The final session consisted of a workshop summary. Participants were asked to choose topics related to their specific work. As a result, country-specific topics were brought into the discussion in addition to the aforementioned areas of interest. After a series of presentations related to a thematic concentration during each session, participants engaged in a moderated discussion that consisted of question and answer, and information sharing components.

The meeting began with a keynote presentation about HIV prevention and MSM by **Ford Hickson** of Sigma Research. Sigma Research is a social research group affiliated with University of Portsmouth, U.K. and specialises in the behavioural and policy aspects of HIV and sexual health.

The meeting ended on the second day with a summary by **Jonathan Elford**, a professor at City University London. His closing talk focused on some of the questions and challenges mentioned during the meeting. Elford presented the common themes in the context of risk management and HIV prevention strategies for MSM and brought a following discussion to a close.

Contemporary HIV Prevention and MSM

In the opening session of the workshop, participants heard from **Ford Hickson** of Sigma Research about a structural overview of HIV prevention and relevant implications for MSM in the U.K. Changes to the demographic make-up of the population with HIV require monitoring alongside changes to public policy, law and service provision that affect HIV prevention needs. Furthermore, HIV prevention and interventions must stay current with the changing face of the HIV epidemic. The implications for behavioural surveillance and HIV prevention efforts are unclear.

Hickson presented information about HIV prevention efforts based on experiences in the U.K. Current HIV prevention interventions are created around specific identified needs that are based on the various places where interventions are being employed. For example, while current HIV prevention needs in Africa have been affected by sexual intercourse among heterosexuals with differing HIV serostatus, the HIV prevention needs of MSM living in London encompass different drivers. Additionally, contemporary HIV prevention needs in the U.K. are much different today than they were twenty years ago. Today, prevention scientists attempt to use behavioural surveillance as a way to inform their work in the context of the role and function of prevention interventions for those people being affected most by the epidemic.

Hickson presented a comprehensive algorithm for how HIV interventions work. He showed that in many HIV prevention designs, an intervention might be developed in order to affect potential variables that influence morbidity. In contemporary HIV prevention interventions, the aim is to increase prevention potential by a specific intervention to reduce transmission behaviours, thus making HIV infections less likely. For many MSM an intervention ideally aims to act as a stimulus to alter a behavioural variable that can affect morbidity.

The make up of HIV in today's MSM population, however, is more complex than ever. Hickson explained the detailed interaction of specific contributors to HIV in the population. The majority of the MSM population engaging in risky behaviours enters and leaves various sexual encounters uninfected with HIV. Some MSM who become infected remain undiagnosed and continue entering and leaving situations of risky behaviour without knowing their HIV status. Those who undergo HIV antibody testing and who become diagnosed as HIV positive, may interact with a smaller number of HIV positive individuals within the MSM population. This may be related to sexual networking and serosorting. Each specific sub-group has special behavioural surveillance needs and contributes to HIV incidence. (See Box 1)

Determining the number of new infections is also a challenging task for surveillance efforts. In order to find the relevant variables affecting new infections, Hickson presented an equation illustrating the interaction of the following variables: I = number of new infections, S = number of HIV discordant sex sessions, and P = average probability of transmission per session:

$$I = S * P$$

The number of new infections is the number of new discordant sex sessions that occur within the average probability of transmission per session.

Risk behaviour, however, is not always a part of sex session between discordant partners, so the equation is then adjusted to account for the additional variables: a = proportion of sex sessions that feature risk behaviour, and p = average probability of transmission per risk behaviour. The updated equation illustrates the interaction of the following variables: I = number of new infections, S = number of HIV discordant sex sessions, a = proportion of sessions that feature sex act, and p = average probability of transmission per sex act:

$$I = S * [(a_1 * p_1) + (a_2 * p_2) + (a_3 * p_3) \dots]$$

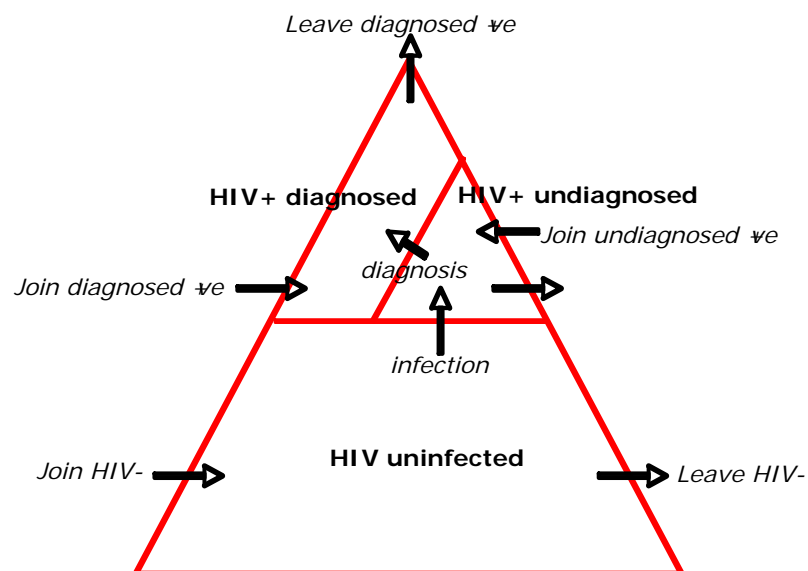
Hickson showed that the rate of new infections over time is then determined by the equation:

$$I/t = S/t * P$$

where I = rate of new infections, S = rate of HIV discordant sex sessions, and P = average probability of transmission per session.

Box 1

HIV Incidence Model



Hickson, F. Sigma Research

The probabilities of transmission in sero-discordant sex sessions are affected by variables that can be stratified by 'sexual position' as well, further complicating HIV behavioural surveillance. Hickson defined 'sexual position' as the combination between a sexual act (insertive or receptive) and a person's HIV serostatus. For example, there is potential variance in risk probability if a person involved in sexual acts is HIV positive and anally insertive, if he is HIV positive and anally receptive, or if he is positive orally insertive. Such variation presents a multitude of possibilities for risk behaviours and transmission potential. Hickson illustrated specific risk variables (sexual act, barrier, medium, positives' infectivity and negatives' susceptibility) in a complex matrix that shows the relationship of each variable to sex between an HIV positive man and an HIV negative man. (See Box 2)

Box 2

Sero-discordant sex	Act	Barrier	Medium	Positive's infectivity	Negative's susceptibility
sex between +ve & -ve	+ve anally insertive	condom	ejaculation	stage ARVs genital STIs	rectal STIs rectal trauma* poppers PEP
	+ve anally receptive	condom	rectal trauma	stage ARVs rectal STIs	genital STIs foreskin PEP
	+ve orally insertive	condom	ejaculation	stage ARVs genital STIs	oral STIs* gum disease PEP

ARVs = antiretroviral drugs; STIs = sexually transmitted infections, PEP = post-exposure prophylaxis.

Source: Hickson, F., Sigma Research

Generally, HIV prevention interventions aim to change behaviour so as to achieve decreased morbidity. This works in the context of interventions aiming to change one aspect of behaviourally mediated risk but can become complicated in the context of multiple, co-occurring variables. To further illustrate, Hickson showed how additional behavioural aspects of morbidity may also affect HIV incidence. A detailed matrix was shown to illustrate the interaction of multiple variables within behavioural interventions. The matrix also illustrates the complexity of multiple HIV prevention intervention measures. The aims of HIV prevention strategies are specifically shown, focusing on what it is they aim to change, what messages from HIV prevention strategies men may be receiving, depending on sexual act, barrier used, HIV serostatus, infectivity and susceptibility. (See Box 3)

Box 3

Sero-discordant sex	Act	Barrier	Medium	Positive's infectivity	Negative's susceptibility
sex between +ve & – ve <ul style="list-style-type: none"> • have no sex • <u>choose your partners carefully</u> • reduce partner numbers • <u>negotiate safety</u> • <u>sero-sort</u> 	+ve anally insertive <ul style="list-style-type: none"> • <u>don't get fucked</u> • <i>don't fuck</i> <i>[strategic positioning]</i>	condom <ul style="list-style-type: none"> • <u>get fucked with condoms</u> • <i>fuck with condoms</i> <i>[strategic positioning]</i>	ejaculation <ul style="list-style-type: none"> • <u>on me, not in me</u> • <i>withdrawal</i> • <i>dipping</i> <i>[tactical ejaculation]</i>	stage ARVs <ul style="list-style-type: none"> • <i>only when undetectable</i> genital STIs	rectal STIs rectal trauma • poppers <ul style="list-style-type: none"> • <u>avoid poppers</u> PEP <ul style="list-style-type: none"> • <u>use PEP</u>
	+ve anally receptive <ul style="list-style-type: none"> • <u>don't fuck</u> • <i>don't get fucked</i> 	condom <ul style="list-style-type: none"> • <u>fuck with condoms</u> • <i>get fucked with condoms</i> 	rectal trauma	stage ARVs <ul style="list-style-type: none"> • <i>only when undetectable</i> rectal STIs	Genital STIs foreskin <ul style="list-style-type: none"> • <u>circumcision</u> PEP <ul style="list-style-type: none"> • <u>use PEP</u>
	+ve orally insertive <ul style="list-style-type: none"> • <u>don't suck</u> • <i>don't get sucked</i> 	condom <ul style="list-style-type: none"> • <u>suck with condoms</u> • <i>get sucked with condoms</i> 	ejaculation <ul style="list-style-type: none"> • <u>don't take cum in mouth</u> • <i>don't cum in his mouth</i> <i>[tactical ejaculating]</i>	stage ARVs <ul style="list-style-type: none"> • <i>only when undetectable</i> •genital STIs	oral STIs • gum disease <ul style="list-style-type: none"> • <u>oral health</u> PEP <ul style="list-style-type: none"> • <u>use PEP</u>

status blind tactics (no formatting), negative men's tactics (underlined), *positive men's tactics (italics)*

ARVs = antiretroviral drugs; STIs = sexually transmitted infections, PEP = post-exposure prophylaxis.

Source: Hickson, F., Sigma Research

Behavioural interventions can also become complex due to co-occurring risk behaviours. HIV prevention among drug-users for example, involves complex interventions in order to simultaneously target HIV prevention and drug use. Additionally, associated behaviours do not necessarily have the same variables leading to transmission, differently affecting both HIV transmission behaviour and subsequent HIV morbidity.

Hickson's concluding remarks focused on how strategies and tactics are employed when MSM think about protecting themselves against HIV risk. *Strategies* were defined as a way for MSM to describe their relationship to risk situations and to develop a resulting plan to protect themselves. A *tactic* was defined as what is actually done to protect one's self from infection, despite a potentially differing plan of action. Hickson illustrated that MSM employ strategies or tactics to alter their behaviour based on perceived protective factors that are influenced by HIV prevention efforts. It may be unclear which HIV prevention initiatives are providing useful information to MSM who try to manage their HIV risk. Clarification is needed about what the actual aim of prevention efforts is amid the interaction of many variables potentially affecting HIV interventions.

Country-Specific Trends in Behavioural Surveillance

During the workshop, relevant data and trends from each participant were presented in brief presentations to clarify the setting in each country. Participants presented information based on their own work, and the resulting thematic issues and areas of interest in each country were diverse. The presentations offered other participants the opportunity to learn about the specific challenges facing each country, to hear about new scientific perspectives, to identify new findings, and to enter into a discussion about some of the general trends occurring in behavioural surveillance in each of the participant countries.

Michael Bochow presented data from a **German** survey of e-dating and risk taking in Germany. He briefly spoke of the design of an online- survey among heterosexual women and men, and homosexual and bisexual men.

Bochow and colleagues developed a questionnaire to find out about HIV risk-taking in a 12-month time frame. They used a sample produced through four e-dating websites for MSM and four e-dating websites for heterosexual men and women. The self-administered questionnaire was accessible online and the response rate was substantial: Bochow's team reported over five thousand completed questionnaires. They also reported about the challenges of administering an online survey, and mentioned the specific difficulty in assessing risk behaviour in HIV related to a dichotomy that assumes MSM are either always or never protective when engaging in risk behaviour.

Dana Paquette presented data on HIV in **Canada** and related challenges, including information on *M-Track*, a surveillance effort among MSM used in Canada. In 2005, MSM were estimated to account for 45% of all new HIV infections in Canada. The estimated number of new infections among MSM in 2005 has not decreased and may have increased slightly compared to 2002.

To better understand the epidemic among MSM, and in response to limitations to routine surveillance data, *M-Track* (a second generation surveillance system of HIV and associated risk behaviours) was developed. The objectives of M-Track are to:

- Describe changing patterns in risk behaviours and HIV-testing behaviours;
- Describe changing patterns in the prevalence of HIV infections; and,
- And as a secondary objective, to consider the possibility of assessing incidence with the detuned assay.

The methodology of *M-Track* involves periodic, repeated cross-sectional surveys at selected sites across Canada, so that trend data can be generated. The sample size at each site is determined in consultation with local partners, and recruitment involves venue-based application of time-space sampling.

M-Track includes a behavioural and biological component. The behavioural component involves a self-administered questionnaire, which includes a core questionnaire that is used across sites, and asks questions about the number and HIV serostatus of sexual partners, and condom use. It also includes questions about drug use and testing behaviours, and about opinions and knowledge of HIV and STIs. The biological component involves obtaining a dried blood specimen, which is tested for HIV, hepatitis C, and syphilis.

One of the major challenges in the study was the need to maintain a consistent methodology to allow for a comparison across sites, while simultaneously allowing those sites to address local needs or concerns. Paquette asked participants whether the detuned assay is being used by anyone else, and how the limitations are being addressed.

Vladimir Martin presented information about MSM and HIV in **Belgium**. In a recent survey and questionnaire conducted in Belgium, questions focused on social relations, discrimination, sex life and behaviour, drug use and addiction, HIV, condom and lubricant use, mental health, and treatment history. A mixed distribution method was used featuring both Internet and paper based survey methods. Distribution venues included gay associations, discos, and the gay press. Results show that current trends are similar to those found in the past several years, in spite of the fact that there is reason to believe UAI may be increasing. Martin expressed concern that the current survey is not sensitive enough. He indicated that established methods should be consistently and regularly improved upon in order to ensure that they are producing information about actual and current trends for surveillance efforts.

Annie Velter presented information and trends among MSM in **France** as reported from two surveys: the *Enquete Presse Gay* and the *Baromètre Gay*. The *Enquete Presse Gay* is a periodic survey that took place for the first time 20 years ago in France, and has been repeated thirteen times, the last of which occurred in 2004. The *Enquete Presse Gay* deals with sexual practices, prevention behaviours, and also includes questions focusing on lifestyle and mental health. The national survey was available in the gay press and for the first time on gay internet sites. More than six thousand questionnaires were completed and included for analysis.

The *Baromètre Gay* took place for the first time in 2000, the third and last version occurring in 2005. The questionnaire collects information on social demographic data, HIV status and sexual behaviour and was available in commercial gay venues such as bars, saunas and in cruising venues, in Paris only. More than three thousand questionnaires completed by men were included for the analysis.

Limitations of both surveys were also highlighted. The population surveyed is not representative of the entire gay population in France, as not all gays read the gay press, are online, or attend gay venues. Additionally, self reported questionnaires could elicit underreporting about sexual risk behaviours

Characteristics of the respondents of the two surveys are similar. The reported mean age was thirty six; and young men under the age of 25 years was low; level of

education was an important factor, and over sixty percent of respondents reported a university level education or higher. Most respondents reported being employed; and about half of the respondents live alone. The surveys indicated that testing for HIV and STIs is high, and that the majority of respondents had at least one HIV test during their lifetime. HIV status was self-reported. Data from the *Baromètre Gay*, indicated that UAI is associated with: young age, lower education, more than fifty partners per year, being HIV positive or unsure of HIV status, drug use, and oral sex with ejaculation with casual partners. The proportions of respondents reporting UAI were nineteen percent in 1997 and thirty three percent in 2004 for those both HIV positive and HIV negative respondents to the *Enquete Presse Gay* survey.

Iryna Zablotska presented information about time trends in behavioural surveillance among MSM in **Australia** using data from surveys in major metropolitan areas in Australia. These surveys include the first gay community periodic survey (GCPS) in Sydney (started in 1996); Melbourne & Queensland (annual since 1998); Adelaide and Perth (biannual since 1998); and in Canberra (every 3 years since 2000,) and offer comparisons across jurisdictions and time. In some cases (e.g., Queensland), recruitment is conducted outside of major cities.

GCPSs used time-location sampling design and produced convenience samples. Participants were recruited at four types of venues: gay social venues, sex-on-premises venues, sexual health clinics, and gay community events. GCPS used a short self-administered questionnaire designed to collect information about HIV serostatus, risky and safer sexual practices such as the number of partners, unprotected anal intercourse with regular (UAIR) and casual (UAIC) partners, disclosure of HIV serostatus, HIV and STI testing, recreational drug use and sociodemographic details

In a total sample, UAIR showed increases in Sydney and Brisbane, and Melbourne; UAIC showed a stable trend from 2001-2006. UAI by HIV serostatus of participants presented as a relatively stable trend from 2001-2006, and was more prevalent across all sites among HIV positives.

Zablotska also presented data on *sexual positioning* (strategic positioning based on HIV serostatus during sexual acts to reduce risk of HIV transmission) among MSM who took part in the survey, illustrating differences in UAI among those who reported as being anal insertive vs. anal receptive sexual partners. The trend for both anal intercourse with regular partners and anal intercourse with casual partners was relatively stable from 2001-2006. In trends about HIV status, it was noted that a much higher percentage of HIV negative men know the status of their partners.

Information about sexual behaviours and HIV risk exposure in MSM in **Switzerland** was presented by **Hugues Balthasar**. He presented data from the *Swiss Gaysurvey 1992, 1994, 1996, 2000, and 2004*, five anonymous and self-administered questionnaires. Details were shared about the survey methods including questionnaire diffusion among all gay newspapers, all gay organisations, all gay bathhouses, and seven gay websites in the Swiss domain. Balthasar stressed that in

2004, the online survey was delayed for two months in order to preserve the original structure of the sample based on the traditional paper questionnaire.

The surveys collected information for behavioural surveillance, including the number of sexual partners with an occurrence of anal intercourse (AI) in the last 12 months, type of sexual act behaviour and condom use. HIV risk exposure was assessed by asking about UAI with a partner with an unknown or different HIV status.

The surveys identified an increase in sexual activity (including a higher number of sexual partners per respondent), an increase in the proportion of MSM practising AI, a decrease in systematic condom use with casual partners, and persistent high levels of risk exposure in gay couples with unspecified *serostatus*. The Gaysurvey 2007 also identified new themes not noticed from previous years, including indications of MSM involvement in risk reduction strategies (*serosorting*, withdrawal, *strategic positioning*) and greater variance in the context in which risk behaviours take place. Methodological issues were expressed and focus on problems arising with Internet surveys and representative sampling.

Jonathan Elford presented trends in the **UK**-based on behavioural surveillance of gay men in London gyms. Elford's study included five to eight gyms in a period from January to March in 1998-2005. The questionnaires were distributed in each gym for one week, and 600-1000 men were surveyed each year.

Elford highlighted specific trends in high risk behaviour (ie unprotected anal intercourse (UAI) with a partner of unknown or discordant HIV status). Results show that high risk behaviour with a casual partner increased between 1998-2001. Since 2001, high risk behaviour with a casual partner has levelled off, with a decline among HIV positive men. No increase in high-risk sexual behaviour with a main partner was recorded. *Serosorting* (choosing sexual partners based on HIV serostatus) increased between 1998-2005, and appeared mostly in HIV positive men engaging in UAI with casual partners who, like themselves, were also HIV positive. Increasing trends of STI transmission among HIV positive gay men in London indicate that serosorting with casual partners is occurring. In contrast, very few HIV negative men were found to *serosort* with casual partners, but were found to be more likely to *serosort* with a main partner.

Ulrich Marcus offered a presentation about sampling issues in behavioural surveillance in the German KABaSTI Study. Different recruitment sites were used for the survey (samples were drawn from medical practices, community venues, and various internet websites). Some of the websites were German gay websites, and one was a *barebacking* website (a social-networking website where people actively seek out unprotected anal intercourse). Among others, data on HIV serostatus and number of sexual partners in the last twelve months were obtained. Wide variations regarding HIV serostatus and numbers of sexual partners were observed in different samples, raising questions about the impact of recruitment strategies on the findings of behavioural surveys.

General findings included disease-specific and cumulative incidences of bacterial STIs (genital, anal or oral gonorrhoea, syphilis, or Chlamydia infection). The highest rates of bacterial STIs among HIV positive individuals were observed on the *bareback* website, and little difference was found between HIV positive men on other

web sites. Likewise, little difference was also found HIV negative men on the *barebacking* website. Individuals recruited from the *barebacking* website seem to have a higher, sexual network associated risk for STIs.

For UAI, 71.1% of all individuals recruited from the *barebacking* website had UAI with partners of unknown status; 38.4% had UAI with serodiscordant partners. The proportion of HIV positive men on antiretroviral therapy (ART) was found to be declining among those diagnosed with HIV after the year 2000. This is believed to be due to a change in treatment strategies from early treatment to delayed treatment initiation.

Sampling Issues in Internet Survey Research

The Internet poses new challenges for survey design and sampling methods. The discussion focused on sampling issues that have evolved with the use of the Internet as a survey venue. Participants agreed that Internet surveys will remain a part of future surveillance efforts, and addressing issues of validity related to sampling approaches is important. Ways to improve recruitment and sampling methods, as well as the integration of both Internet and paper-based surveys were explored.

The variability and lack of control in recruitment via the Internet affects both sample size and composition. The diversity of users on the Internet, in particular, makes it difficult to find sampling methods that are valid. Some of this arises from population distribution on Internet websites. Random sampling is ideal; however, to date only convenience samples can be achieved. Checking reliability in sampling methods by comparing cross-sectional studies over time may be useful. However, at the current time, the internet as a medium for socializing is still in a dynamic phase of development resulting fluctuations in sample composition, even when using the same sites.

Integrating methodological approaches is important including the combination of newly developed surveys for the Internet with those developed for paper distribution. There are often marked differences in samples recruited through the Internet as compared to other venues, as documented by the French and Swiss surveys. There are diverse ways in which paper based and Internet surveys can be used in a process of triangulation in order to strengthen validity, as demonstrated by U.K. researchers.

Incidence Trends and Incidence Measurement

The following presentations addressed incidence trends and issues of incidence measurement in selected participant countries.

Valerie Delpech and **Sam Lattimore** presented information from the **U.K.** focusing on national HIV incidence surveillance and HIV testing. Utilizing HIV test-taking, national HIV incidence surveillance in the U.K. details all HIV tests provided at specific testing centres throughout the U.K. (in the U.K. these centres are called Genito-Urinary Medical or GUM clinics). The data also shows testing patterns over time.

HIV/AIDS epidemiologic surveillance in the U.K. includes monitoring of CD4 cell counts at HIV and AIDS diagnosis. Despite general levels of awareness of the risks for HIV acquisition almost a third of HIV infected MSM have not had their infection diagnosed. Also, in recent years, more than one in five of newly diagnosed MSM were diagnosed late – at an advanced stage of disease progression.

Delpech and Lattimore discussed the potential importance of data regarding time of diagnosis for HIV prevention. HIV-infected individuals diagnosed late may not fully benefit from therapy and are at an increased risk of dying as a result. Late diagnosis also means that infected individuals cannot benefit from clinical and behavioural interventions targeted to infected individuals which can reduce the spread of the virus.

Delpech and Lattimore expressed concern about GUM testing efforts in the U.K. Since much of the current U.K. HIV test data come from GUM clinics, the collected data may only be representative of specific regions in which the GUM clinic structure is well-established. Thus, the incidence measured may carry a regional skew.

Ulrich Marcus and **Axel J. Schmidt** presented information about HIV incidence in the KABAStI study and in routine HIV surveillance in **Germany** for MSM. The study compared study participants by year of diagnosis and age at diagnosis with routine surveillance data, and traced the age distribution of HIV positive participants at time of HIV diagnosis. Since 2001, routine HIV surveillance in Germany also provides data on median CD4 counts at HIV diagnosis by year of diagnosis, transmission risk, and age group. Data are also collected on median time to last negative test by year of diagnosis and age group. The study also tracked age distribution of HIV negative KABAStI participants at time of last testing. Taken together, the data suggest a trend in recent years toward more frequent HIV testing behaviour, and hence earlier diagnosis of HIV in MSM of every age group. However, this trend does not seem to provide a full explanation for increasing incidence of HIV diagnosis.

Jonathan Elford explored some of the potential factors influencing the number of HIV diagnoses among gay men in the **UK**. The study, undertaken by Sarah Dougan and colleagues, aimed to explore the recent increase in HIV diagnoses among men

who have sex with men in the UK, and whether it reflects a rise in HIV incidence or increased uptake of HIV testing.

HIV diagnoses among MSM in the UK rose by 54% between 1997 and 2004, with variation by age and geographical location. Only MSM younger than 35 years of age in London showed no increase. Throughout the UK, uptake of HIV testing increased significantly among MSM attending GUM clinics between 1997 and 2004, including "at-risk" MSM. Direct incidence estimates (based on STARHS) provided no evidence of a statistically significant increase or decrease in HIV incidence. Indirect estimates suggested that there may have been a rise in HIV incidence, but these estimates were influenced by the increased uptake of HIV testing.

Potential factors influencing new HIV diagnoses include: the number of MSM seeking testing; migration and travel; transmission (incidence), and new testing campaigns and efforts. Based on the study, they found that the increase in HIV diagnoses among MSM in the UK since 1997 seems to reflect an increase in HIV testing rather than a rise in HIV incidence. (For more information, see related paper in *Further Reading*: Dougan 2007.)

Jörg Bätzing-Feigenbaum and **Ulrich Marcus** presented findings on medical practice diagnoses made in Berlin, **Germany**. A high proportion of recent infections in the age group 20-25 was observed, and 76% of MSM who are newly diagnosed with HIV and who have a primary relationship report having sex outside the relationship. Data from the KABaSTI study indicates that HIV testing trends show people being tested at younger ages.

John Imrie gave a brief presentation on HIV testing trends and issues of measurement in **Australia**. They presented the variables measured in Australia, including: newly acquired HIV positive test results within the past 12 months, time since last HIV test, self-reported HIV status, and undetectable viral load. Data from New South Wales showed stabilization over time, while those from Victoria and Queensland showed an increase in newly acquired HIV. From 2001-2005 there were no significant changes in self-reported HIV status among all MSM groups (HIV negative, HIV positive, and those with unknown status) in Sydney, Melbourne, and Brisbane.

The discussion following the presentations in session two focused on improving HIV incidence measurement. Participants were interested in finding types of information to use as indicators for such measurement. They also focused on ways that incidence measurement can be applied to health promotion efforts.

Although participants recognized that there are difficulties in measuring true incidence, they were interested in exploring the rationale or explanation for potential increases in observed incidence. The new initiatives in the U.K. prompted questions about the role of government campaigns for HIV testing and incidence measurement. There is lack of clarity about whether infections are in fact new, or whether previously infected individuals have more opportunity to be tested and diagnosed.

Increased “contact risk” related to the growing size of the HIV positive population (due in part to HAART) may also contribute to an increase in observed numbers. A variety of factors in addition to prevalence, including demographics, increased transmission, reporting trends, and migration are all possible influencing variables that determine probability of risk for infection among the MSM.

Participants also were interested in qualitative factors of HIV incidence measurement, and agreed that more inquiries are needed that examine confidentiality, data security, and types of HIV tests pursued by testers. For example, it is unclear if those people who seek a traditional test are different from those who pursue the rapid test. The time an individual last had an HIV test is also an important measure that should be more closely monitored around incidence. It is also unclear whether people are more likely to be tested due to increased government campaigns to promote testing.

Interpreting test results is more complex in a time of increased transmission, and this may potentially affect measurements of incidence among test takers. Clinic data has limited information available on repeat testers. For example, the test data shows the number of incident infections based on the number of tests given. Ideally, test data would be able to show not only the number of tests given, but also indicators of the actual people tested and whether or not they are first time or repeat.

Internet Sex Seeking, Drugs, and Personal Characteristics

Jonathan Elford presented findings from a **London** study focusing on the Internet and sex-seeking. The premise for the study was to examine the association between seeking sex on the Internet and sexual risk behaviour. Most men who are online are also those same men who are out in other venues like bars and clubs. There were two hypotheses presented as to why men who seek sex on the Internet face a higher behavioural risk: the 'self-selection hypothesis' that high risk men may gravitate to the Internet; and the 'accentuation hypothesis' that seeking sex through the Internet may in some way amplify risk behaviour.

Elford's study findings show that HIV positive men in London were more likely to meet other HIV positive men for unprotected sex online, rather than offline. Compared with offline venues (bars, clubs, etc), the Internet provides a relatively safe environment where HIV positive men can disclose their status. By *serosorting* on the Internet HIV positive men could establish concordance in a way that could not happen so easily offline. While *serosorting* can reduce the risk of HIV transmission between sexual partners, it still carries an STI risk.

Data from the study, however, shows that many gay men in London who looked for sex online also looked for and met casual partners offline. Men were just as likely to report "unsafe sex" with a casual partner they met in a bar as those who met in a club or on the Internet. Additionally, the study produced no evidence that the Internet, per se, creates a risk for HIV transmission.

Data do suggest, however, that *serosorting* on the Internet contributes to STI transmission risk among HIV positive gay men in London. Data also suggest that, in relation to HIV transmission, high-risk men gravitate towards the Internet rather than the Internet accentuating HIV risk.

Michael Bochow presented results from an online-survey among heterosexual women and men and homo- and bisexual men in **Germany** focusing on e-dating and risk taking.

Evidence from the study indicates that the Internet itself does not pose more of a risk than other dating venues. Contrary to some studies, the study shows that translating an online contact into a real live contact is not easy.

The survey also indicates that there is little difference in trends between e-dating and other dating venues. Data on the number of sexual partners and the frequency of drug use shows a slightly higher proportion of risk-taking among MSM who e-date in comparison to those MSM with offline activities. Thus, MSM who are active online are active with more sexual partners and are more often drug users, but this is a fading trend.

Trends show that age and sex is normalizing on the Internet: for example, the Internet is familiar among all gay men, including older men, contrary to the common

belief that it might be more popular among younger people. This change of surveyed population over time presented some challenges. There were problems with sampling for age, for example: in 1991 half the sample of MSM was younger than 30, compared to 1999 when only a quarter was younger than 30. As more people use the Internet, it will be possible to increasingly recruit individuals under 30.

The results of the study were also affected by relying on self-reporting of risk behaviour. Achieving representative samples is an issue common to many Internet surveys that due to the nature of the Internet must rely on samples of those individuals who are online and choose to participate.

Additionally, it was challenging to find Internet sites where heterosexuals look for sex.

Axel J. Schmidt showed that MSM from **Germany** who used the Internet rather than other “locations” for finding sexual partners were less likely to be HIV positive or report a history of STIs in the 12 months preceding the study; they were also less likely to have more than ten different, or anonymous, sexual partners. Furthermore, no difference could be seen with respect to reporting unprotected anal intercourse with partners of unknown HIV serostatus. These findings contrasted with previous data from the UK. It was debated whether this was due to temporal effects, and the broadening access to and or use of the Internet as a medium or “location” for finding sexual partners.

John Imrie presented study findings about Internet use, recreational drugs and sexual adventurism in **Australia**. In contrast to Bochow’s study in Germany, 72% of men who looked for sex on the Internet were successful. Possible reasons considered include differences in who is seeking online and for how long. This shows the importance of collecting specific data about factors such as time online for partner search.

Individual drug use varies across Australian cities, and shows fluctuations over time. More than 70% of all gay men reported any drug use over time, and predominant majority of them used more than one drug. The reported use of crystal methamphetamines was highest in Sydney compared to other cities, but has been increasing in all jurisdictions in the recent years.

Jeffrey Parsons reported on a study of risk behaviours among a sample of sexually compulsive gay and bisexual men in **New York City**. HIV positive and HIV negative men were surveyed for problematic sexual behaviour/compulsivity. In the survey, psychosexual characteristics were defined as romantic obsession, sexual sensation seeking, and temptation for unsafe sex. Additional variables were collected including, drug use, STI history, and intentional risk behaviors such as *barebacking*.

The results of the study showed that overall, risk behaviours are highest among HIV positive men. HIV positive men are more likely to report drug use, have experienced three to four times more STIs in their lives, and seek sex without a condom.

Additionally, the survey showed that HIV positive men are nearly four times as likely to identify as *barebackers* as compared to HIV negative men.

Danny Carragher presented information from a **New York University** study on HIV seroconversion in gay and bisexual club drug users.

The U.S. National Institute on Drug Abuse (NIDA) sponsored study, called Project BUMPS, was a one-year longitudinal study of 450 gay and bisexual men who use club drugs (i.e., cocaine, crystal methamphetamine, MDMA, ketamine and GHB) before or during sex with another man. It also examined club drug use and its interactions with sexual risk taking as well as psychological and sociological factors.

The study consisted of four measurement points (baseline, 4-, 8-, and 12-months), and included quantitative data collected via Audio Computer Assisted Self Interview (ACASI) and via audio taped face-to-face interview. An OraSure HIV test was also given to participants reporting HIV negative or unknown status. Participants were asked about club drug use, their sexual behaviours, and were screened for psychosocial measures. They were also asked to self-report HIV status, race/ethnicity, and socioeconomic status.

The New York University study indicates that complex interactions exist between drug use, sexual behaviours, and psychosocial realities for gay and bisexual men. Drug use alone is not a sufficient predictor of sexual risk taking, but rather contextual reasons for drug use should be examined. Psychosocial factors distinguishing HIV sero-converts from HIV negative men should also be further examined. While the sero-converts engaged in significantly more UAI with presumed negative partners, both groups engaged in unprotected behaviours.

The study raised questions about how to gather information on men who convert from HIV negative to HIV positive (seroconverts). Carragher was especially interested in ways to use such information on seroconverts to inform qualitative studies that aim to focus on protective factors for men who are high risk but have not yet seroconverted.

Specific risk reduction and management strategies for MSM

In session three, participants shared how they are examining HIV risk management in their work. Of specific concern was how to examine the consequences of HIV risk management strategies for the transmission of other co-occurring STIs. Some participants wondered about the impacts of increased STI incidence and prevalence on HIV transmissibility.

New behaviours were discussed, including patterns of serosorting (partner selection based on HIV serostatus) and serostatus disclosure. It is still unclear what the extent of *serosorting* behaviour is. Participants report different opinions about which men are *serosorting*, where men are *serosorting* (online or in person) and with whom they are *serosorting* (only with regular partners?). Additionally, there is no consensus on the accuracy of HIV serostatus disclosure. Seropositioning (strategic positioning based on HIV serostatus during sexual acts to reduce risk of HIV transmission) and withdrawal (also called *dipping*) was also a topic of discussion. Participants discussed the degree risk management strategies are being captured by behaviour surveys. They also questioned whether there are variable consequences based on surveying for such behaviour in different cultural settings.

Peter Keogh spoke about qualitative research studies on risk reduction strategies in the **UK**. His presentation reported on five different studies undertaken over the last ten years by Sigma Research on UAI in various contexts with a range of groups. The studies focused on beliefs or knowledge about HIV status and contexts of anal intercourse and UAI. The studies involved in depth face to face interviews with a combined total of 232 men.

In the work of Sigma, three imperatives have been identified to generate research questions that attempt to find out what men need in order to engage in risk perception and management. Men need to be aware of the extent and nature of the harm they face, they need to know their own and their partner's HIV status, and they need to be able to communicate this knowledge to partners. For the purposes of scientific interventions, it is important to identify what types of risk or harm men perceive when they engage in UAI.

It is also important to understand what *knowledge* of men's own or partner's HIV status means to men who engage in risk behaviour. Keogh identified various types of risk or harm that men perceive when they engage in UAI. In the studies, Keogh and colleagues found that risk perception and management is mediated by HIV status.

Men who believed themselves to be negative felt they were risking a catastrophic event of becoming infected. Whether or not they thought about what it would mean for them to face such a risk or harm was unclear. Men who perceived themselves to be HIV negative assumed roles that were influenced by what they knew about living with HIV and the kinds of social networks in which they live.

For men who had been diagnosed as HIV positive, they felt that risk affected their sense of selves as moral actors. That is, MSM who were HIV positive viewed their

role in risk behaviour as moral actors who might have to live with the knowledge of having infected someone or having put another person at risk. The social networks an individual may inhabit, and the social norms that prevailed within those networks would accordingly influence such moral considerations.

Relationship status also affected the way MSM think about risk behaviour. For HIV positive men, the risk involved with infecting an anonymous partner was qualitatively different from the risk involved with infecting a long term partner. Accordingly, there were different concerns and different ways of managing that risk. In a relationship, the frequency of risk taking, sexual history and experience of each person influenced both partners' perception of the magnitude of risk and their subsequent action for risk management.

In contrast, the degree of consequence perceived in risk behaviour between casual or anonymous partners increased or decreased depending on the location where a partner was found. For example, risk was perceived differently if partners were found in a backroom versus a cruising area, or in a club known for having many HIV positive men versus a casual one-night stand with a younger inexperienced partner. Certain groups of negative men perceived little or no risk precisely because they believed either that there were no HIV positive men in their social or sexual circle, or that others shared their moral system and would disclose if they were HIV positive. Context, setting, social network, social norms and common systems of values profoundly influenced the various ways that risk was perceived.

That which constitutes knowledge about one's own HIV status may be based on test results, and it may be based on one's perception of the surrounding world. Knowledge of a partner's HIV status is often derived from a variety of factors, including: location (where the partner is found, i.e. a sex club), peers (who the partner is seen with, i.e. HIV positive men), appearance (what that partner is wearing, i.e. leather) and activity (what the partner is doing, i.e. sexual intercourse without a condom in a backroom). An individual's social setting and social network also influences knowledge. Therefore the actual qualities of a partner are as important as a perceived affinity with those qualities. For example, it is not only important for an individual to consider what the partner's appearance is as much as it is important that the appearances match.

Keogh illustrated the important relationship between how MSM think about HIV risk management and their risk behaviour in the social context. The following influences risk management: men's social networks (demographic composition, i.e. HIV positive peers), social systems (type of relationship, romantic, marital, etc.), social norms, sub-cultural settings (venues, websites, identities), and social capital.

Axel J. Schmidt presented data from **Germany** about specific risk reduction and *serosorting* activities. His data showed groups stratified by HIV serostatus, frequency of unprotected anal intercourse, and attitudes towards "safer sex" (defined in this data set as barebacking) around the survey question: "Under what condition would you skip the condom in anal intercourse?" Results showed that a regular partner's serostatus (positive, negative, or untested) highly depended on the participants

serostatus, that bareback users were more likely to serosort or to leave the decision whether or not to use a condom to their respective casual partner.

Iryna Zablotska presented trends in *seroconcordant UAI* and disclosure of HIV serostatus to casual partners in **Australia**. Australian studies measure self reported *seroconcordance*, disclosure, and UAI among MSM, but do not collect information about individual intentions to *serosort*, and whether or not there was an active search for partners of the same HIV status. Australian cohorts of HIV positive and negative men (PH and HIM respectively) measure assumptions of partners serostatus and Zablotska used term *seroguessing* to denote the practice of *serosorting* based on assumptions of partner's HIV serostatus). She presented data from PH and HIM on the proportion of men who engage in UAIC and seroguess.

The periodic surveys showed that the proportion of men in serodiscordant regular relationships slightly decreased over time. There was no reported change in seroconcordant positive or negative relationships. Cohort data shows increases in rates of UAI with seroconcordant casual partners, reported by both HIV positive and negative men.

According to the studies, the overall proportion of men who disclose their HIV status to their partners is high. PH and HIM studies did not have comparable information about disclosure to casual partners, so Zablotska presented only data for HIV positive men. Disclosure of serostatus to all casual partners increased over time, including HIV positive and negative partners.

Huges Balthasar presented information from two **Swiss** studies conducted in 2000 and 2004 that examined withdrawal before ejaculation as a way to manage perceived risk of HIV infection among MSM.

A minority of MSM reported practising withdrawal before ejaculation as a way to manage HIV risk transmission, and the practice did not increase between 2000 and 2004. That HIV-positive respondents more often reported this practice is of concern, since the precise degree of effectiveness of this strategy has not been established. The studies implied that it is necessary to monitor risk reduction strategies by MSM, such as withdrawal before ejaculation, in order to adapt and target prevention messages.

Axel J. Schmidt presented information from the **German** KABAStI study, which examined *seropositioning* and withdrawal among MSM. HIV positive MSM were much more likely to not use a condom if receptive, while HIV negative MSM showed a tendency to not use a condom if insertive. This effect seemed to be more pronounced in participants with casual partners, or with a real life history of unprotected anal intercourse. The study also indicated that actions that provide little protection from actual risk, like withdrawal before ejaculation, might be seen as perceived protective behaviours in MSM.

Ulrich Marcus spoke about the routine surveillance of syphilis infections in MSM living in metropolitan areas in **Germany** from 2001-2006. Studies have shown a rise of cases of the disease in Germany since 1999-2000. Many individuals experienced repeat infections, suggesting that syphilis is circulated within restricted core groups at high risk of acquiring STIs.

Marcus identified the clinical implications of screening for STIs and connections to HIV testing and management. Frequency of UAI with anonymous partners of different HIV status, for example, provides important information about the relationship between STI prevalence and HIV risk. High incidences of other bacterial infections identified through screening can also have implications for assessing potential UAI.

Risk Management and HIV Prevention Strategies for MSM

Jonathan Elford presented a summary of salient trends and related challenges raised by participants during the meeting. Participants from Germany and Belgium, for example, indicated that reports of new HIV cases in those countries seem to be levelling off. In New York there was an apparent peak in HIV in 2003, followed by a steady declining trend. Common questions arising in the context of the workshop focused on whether or not HIV is actually levelling off in the countries represented by the participants. Participants were interested in finding out if there is a stabilization trend across various country-specific populations.

The participant presentations showed that researchers are aware that HIV risk management is occurring in MSM, but questions remain about how and what to measure in order to present an actual picture of current HIV risk management issues. In Canada, for example, there is interest in new tools that can offer greater sensitivity in measuring incidence. Participants at the meeting agreed that a common goal is to contribute to the decrease in HIV incidence, but questions remain about how exactly incidence is to be measured. New infections come from behaviour, but it is unclear how incidence measurement can be as a marker of changes in those behaviours.

Many participants are beginning to use or consider using the Internet in their work. There was concern at the meeting about new methodological challenges brought about by working with the Internet, as the implications for sampling and validity are still unclear. Participants agreed that the Internet will continue to pose a salient challenge in surveillance work, and new methods or combinations of methods should be further explored. For example, participants raised new ideas about using methodological triangulation to enhance their survey work.

Participants were also interested in improving behavioural surveillance by taking into account the larger social context in which MSM live. MSM may assume themselves to be negative in terms of their proximity to HIV or HIV in their community, that is, not just at an individual level related to risk management and behaviour. Participants were motivated to think about the complex social context of MSM in which risk management occurs. Men's social networks, social systems, social norms, sub-cultural settings, and social capital are critical to their perceptions of risk behaviour.

Participants also explored the specific research challenges that exist with MSM who also are drug users. For co-occurring drug use, it is important to find out which effects there are on data collection and data reporting, because such effects might raise new challenges in measuring behaviour and risk for HIV. From participant reports, it is evident that drug use is country-specific; it is frequent only in certain regions and in certain MSM populations. For example, while crystal methamphetamine use in MSM in Sydney provides challenges to scientists trying to depict risk behaviour, co-occurring drug use is minimal in Switzerland and does not pose a salient challenge.

The exact meaning of *serosorting* and what constitutes the related behaviour are still defined in different ways. Participants have not yet clearly described how *serosorting*

comes about, or how it is occurring in the population, and there is little consensus about the implications it has on research. Nevertheless, those behaviours associated with *serosorting* have become a salient issue in behavioural research. Epidemiologic evidence points to behaviours that indicate *serosorting*: for example, data from the RKI KABA-STI study infer *serosorting* in HIV positive men based on observations of differential STI circulation among HIV positive and HIV negative men. It is unclear how *serosorting* behaviour impacts the incidence of HIV.

Participants agreed that studying *serosorting* poses general methodological problems in research. The impact on surveillance of different *serosorting* behaviour between HIV positive or HIV negative MSM, or of different *serosorting* behaviour among MSM in physical and virtual places poses unique challenges to researchers.

Additionally, participants were concerned about the goal of applying terms to describe the behavioural trends being seen in research. The implications of allocating names to behaviours are unknown. It is unclear if behaviours associated with *serosorting* for example, might be affected if MSM begin to use the terms being used to define their behaviour. For example, HIV positive MSM may begin to identify as “*serosorters*” when responding to surveys, a response that may or may not affect their actual behaviour when choosing partners.

Some MSM do not know their serostatus, and studies show that there are differences in their disclosure behaviour. Whether or not men disclose and the reasons they do or do not do so is a complex and challenging dynamic to measure. Men must know their testing history and that of their partners in order to disclose accurately. Additionally, diseases other than HIV such as STIs have been shown to persist because people do not readily disclose.

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